

CLAIMS

1. An audio user-interfacing method in which items are represented in an audio field by
5 corresponding synthesized sound sources from where sounds related to the items appear to
emanate, the method including the steps of:
(a) allocating the sound sources to groups of at least one sound source; and
(b) automatically and cyclically changing the audibility of the sound sources such as to un-
mute the sound sources of each group in turn for a limited period with the sound
10 sources of the groups other than the un-muted group being at least partially muted.
2. A method according to claim 1, wherein the sound sources are grouped according to at
least one characteristic of their respective associated items.
- 15 3. A method according to claim 1, wherein the sound sources are grouped according to
their positions in the audio field
4. A method according to claim 1, wherein the sound sources are grouped by a user.
- 20 5. A method according to claim 1, wherein each sound source has its own respective
group.
6. A method according to claim 1, wherein at least one group of sound sources is treated as
an exception and is left un-muted.
- 25 7. A method according to claim 1, wherein the duration of said limited period is adjustable
by a user.
8. A method according to claim 1, wherein the group whose limited period of being un-
30 muted is ending is cross-faded with the group whose period of being un-muted is next to
occur.

9. A method according to claim 1, wherein each group is associated with a respective audio-field reference relative to which the sound sources of the group are positioned, the audio-field references being independently movable relative to a presentation reference which is determined by a mounting configuration of audio output devices used to synthesise said sound sources.

10. A method according to any one of the preceding claims, wherein the audio field is stabilised relative to one of:

- a user's head;
- a user's body;
- a vehicle in which the user is travelling;
- the world;

this stabilisation taking account of whether audio output devices used to synthesise the sound sources are world, vehicle, body or head mounted, and, as appropriate, rotation of the user's head or body, or turning of the vehicle.

11. A method according to claim 1, wherein at least some of the said items represented by the sound sources are audio labels for services, the method further involving selecting a service by selecting the corresponding audio-label sound source.

12. Apparatus for providing an audio user interface in which items are represented in an audio field by corresponding synthesized sound sources from where sounds related to the items appear to emanate, the apparatus comprising:

- storage means for storing data concerning the sound sources, this data including grouping data associating sound sources in groups of at least one sound source;
- rendering-position determining means for determining, for each said sound source, an associated rendering position at which the sound source is to be synthesized to sound in the audio field;
- audibility-determining means for determining the audibility of each sound source based on its group, the audibility-determining means being operative to automatically and cyclically change the audibility of the sound sources such as to un-mute the sound sources of each group in turn for a limited period with the sound sources of the

groups other than the un-muted group being at least partially muted; and

- rendering means, including audio output devices, for generating an audio field in which said sound sources are synthesized at their associated rendering positions and with audibility as determined by said audibility-determining means.

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13. Apparatus according to claim 12, further comprising means for automatically grouping the sound sources according to at least one characteristic of their respective associated items.

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14. Apparatus according to claim 12, further comprising means for automatically grouping the sound sources according to their positions in the audio field

15. Apparatus according to claim 12, further comprising a user input arrangement for enabling a user to allocate the sound sources to groups.

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16. Apparatus according to claim 12, wherein each sound source has its own respective group.

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17. Apparatus according to claim 12, further comprising a user input arrangement for enabling a user to adjust the duration of said limited period.

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18. Apparatus according to claim 12, wherein the audibility-determining means includes cross-fade means for cross fading the sound sources of the group whose limited period of being un-muted is ending with the sound sources of the group whose period of being un-muted is next to occur.

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19. Apparatus according to claim 12, wherein the rendering-position determining means comprises:

- means for setting the location of each said sound source relative to an audio-field reference;
- means for controlling an offset between the audio field reference and a presentation reference, the presentation reference being determined by a mounting configuration

of the audio output devices; and

- means for deriving the rendering position of each sound source based on the location of the sound source in the audio field and said offset.

5 20. Apparatus according to claim 19, wherein the said means for setting an offset between the audio field reference and a presentation reference, comprises user input means for enabling a user to change said offset, and stabilisation means for varying the said offset such as to stabilise the audio field reference relative to one of:

- a user's head;
- 10 - a user's body;
- a vehicle mounting the apparatus;
- the world.

15 21. Apparatus according to claim 12, wherein at least some of the said items represented by the sound sources are audio labels for services, the apparatus including a selection arrangement for selecting a service by selecting the corresponding audio-label sound source.

20 22. Apparatus for providing an audio user interface in which items are represented in an audio field by corresponding synthesized sound sources from where sounds related to the items appear to emanate, the apparatus comprising:

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- a data store means for storing data concerning the sound sources, this data including grouping data associating sound sources in groups of at least one sound source;
 - a rendering-position determining arrangement operative to determine, for each said
 - 25 sound source, an associated rendering position at which the sound source is to be synthesized to sound in the audio field;
 - an audibility-determining arrangement operative to determine the audibility of each sound source based on its group, the audibility-determining arrangement being further operative to automatically and cyclically change the audibility of the sound
 - 30 sources such as to un-mute the sound sources of each group in turn for a limited period with the sound sources of the groups other than the un-muted group being at least partially muted; and

- a rendering subsystem, including audio output devices, arranged to generate an audio field in which said sound sources are synthesized at their associated rendering positions and with audibility as determined by said audibility-determining arrangement.

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23. Apparatus according to claim 22, further comprising an arrangement operative to automatically group the sound sources according to at least one characteristic of their respective associated items.

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24. Apparatus according to claim 22, further comprising an arrangement operative to automatically group the sound sources according to their positions in the audio field

25. Apparatus according to claim 22, further comprising a user input arrangement for enabling a user to allocate the sound sources to groups.

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26. Apparatus according to claim 22, wherein each sound source has its own respective group.

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27. Apparatus according to claim 22, further comprising a user input arrangement for enabling a user to adjust the duration of said limited period.

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28. Apparatus according to claim 22, wherein the audibility- arrangement includes a cross-fader arranged to cross fade the sound sources of the group whose limited period of being un-muted is ending with the sound sources of the group whose period of being un-

25 muted is next to occur.

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29. Apparatus according to claim 22, wherein the rendering-position determining arrangement comprises:

- a setting arrangement for setting the location of each said sound source relative to an audio-field reference;
- a control arrangement for controlling an offset between the audio field reference and a presentation reference, the presentation reference being determined by a mounting

configuration of the audio output devices; and

- a deriving arrangement operative to derive the rendering position of each sound source based on the location of the sound source in the audio field and said offset.

5 **30.** Apparatus according to claim 29, wherein the said setting arrangement comprises a user input arrangement for enabling a user to change said offset, and a stabilisation arrangement operative to vary the said offset such as to stabilise the audio field reference relative to one of:

- a user's head;
- 10 - a user's body;
- a vehicle mounting the apparatus;
- the world.

15 **31.** Apparatus according to claim 22, wherein at least some of the said items represented by the sound sources are audio labels for services, the apparatus including a selection arrangement for selecting a service by selecting the corresponding audio-label sound source.

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